

January 21, 2005

Submitted Electronically

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Shared Use of the 2496-2500 MHz Band between Industrial, Scientific and Medical (“ISM”) Devices and Broadband Radio Service (“BRS”); IB Docket No. 02-364 and ET Docket No. 00-258; Ex Parte Statement of the Association of Home Appliance Manufacturers (“AHAM”)

Dear Ms. Dortch:

Pursuant to the provisions of Section 1.1206 of the rules of the Federal Communications Commission (“FCC” or “Commission”) AHAM submits this correspondence in the above referenced proceedings in support of its position that the FCC should not take action that establishes an in band emission limit on ISM devices that operate in the bands 2496-2500 MHz. The FCC is asked to consider this correspondence in its evaluation of the petitions for reconsideration submitted by the Wireless Communications Association, Sprint Corporation and Nextel Communications, Inc. (collectively, the “BRS Parties”).

The BRS Parties’ petitions for reconsideration ask the FCC to revisit its decision that made the 2496-2500 MHz band available for Broadband Radio Service (“BRS”) use, by imposing, for the first time, an in band emission limit on ISM devices operating in that band.^{1/} On November 8, 2004, AHAM submitted Replies in this proceeding, urging the Commission to deny the petitions for reconsideration with respect to the ISM issues. On December 17, 2004, the Wireless Communications Association (“WCA”) submitted a surreply (the “Surreply”) intended to respond to AHAM’s November 8, 2004 Reply and the replies of certain AHAM members. Regrettably, the Surreply contains inaccuracies and an incomplete assessment of the impact that the petitions for reconsideration would have on manufacturers of ISM devices in general and microwave ovens in particular. This correspondence is intended to address those inaccuracies and provide the FCC with a more realistic assessment of this issue.

^{1/} *Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands and Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Service to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, IB Docket No. 02-364 and ET Docket No. 00-258, Report and Order, Fourth Report and Order and Further Notice of Proposed Rule Making, FCC 04-134 (2004).

The Risk of Co-Channel Interference

The Surreply states that “[t]he Microwave Oven Manufacturers do not dispute that operation of ISM devices at the unlimited power levels permitted under Section 18.305(a) will expose BRS channel 1 licensees to harmful interference at 2496-2502 MHz.”^{2/} WCA is wrong. Neither AHAM nor its members concurred with the unfounded assertions of the BRS Parties that ISM operations will cause harmful interference to BRS operations. To the contrary, AHAM notes that the BRS Parties have provided no credible evidence that ISM operations will cause harmful interference to BRS use. The BRS Parties do little more than point out that ISM and BRS operations will inhabit the same band. The BRS Parties have performed no testing, conducted no studies, or otherwise responsibly evaluated the potential for harmful interference to BRS operations from ISM devices. Instead, the BRS Parties attempt to shift the burden of proof to AHAM to demonstrate that there will be no harmful interference from microwave operations to BRS systems. That burden of proof should fall on the BRS Parties, not AHAM and the manufacturers of microwave ovens. There is no verifiable evidence that ISM devices will cause harmful interference to BRS stations. Yet, the BRS parties would have microwave manufacturers undertake the enormous expenses necessary to redesign a nearly ubiquitous consumer device in favor of a service that does not yet exist.^{3/} Such a result is anti-consumer and contrary to the public interest.^{4/}

In addition to claiming -- without justification -- that BRS operations will receive harmful interference from microwave ovens, the BRS Parties assert that microwave ovens are spectrally inefficient and, consequently, should accommodate BRS operations. Yet, like its claims of harmful interference, the BRS Parties assertions of spectral inefficiency are also unjustified. Accordingly, the two bases on which the BRS Parties claims rest are without any support in the record.

Resolution of Any Interference May be Accomplished by Less Intrusive Means

In the unlikely event that microwave ovens cause harmful interference to BRS operations, the FCC should first consider other methods for addressing that interference, without requiring complete re-design of one of the most ubiquitous consumer products. Microwave ovens and other ISM devices operate within the regulatory scheme long established for use in the 2496-2500 MHz band. The Commission should continue to accommodate these devices in the band. For example, if operation of microwave ovens in the immediate vicinity of BRS transmitters proves problematic, the Commission should first consider requiring BRS licensees

^{2/} Surreply at 3.

^{3/} The modifications necessary to existing microwave ovens are detailed further below.

^{4/} As AHAM pointed out earlier, not only is this result contrary to the public interest, but it is also contrary to Commission precedent which requires entities new to a band to ameliorate any interference issues presented by their entry to the band.

to advise consumers that BRS transmitters should not be operated in the vicinity of microwave ovens.^{5/} In fact, evidence suggests that separation between microwave ovens and so-called Bluetooth devices may ameliorate the potential for harmful interference to those devices.^{6/} Similarly, in evaluating the potential interference from ultra-wideband (“UWB”) devices to satellite operations, the FCC stated that the resolution of interference “could be as simple as relocating the UWB device away from a window.”^{7/}

Microwave Ovens Would Require Complete Redesign to Conform to the BRS Parties’ Requirement

In the unlikely event the FCC overlooks the fact that the BRS Parties have failed to justify -- with field tests or any other measurable results -- the alleged impact of microwave ovens on BRS stations, the Commission should consider that requiring microwave oven manufacturers to comply with new in-band emission limits will require complete redesign of this consumer product.^{8/}

^{5/} Because BRS base station antennas will likely be operated on buildings and similar structures, it is not reasonable to expect harmful interference to base stations. Instead, any harmful interference would be restricted to consumer devices.

^{6/} Rondeau, D’Souza and Sweeney, Residential Microwave Oven Interference on Bluetooth Data Performance. IEEE Transactions on Consumer Electronics, Vol. 50, No. 3, August 2004. AHAM does not suggest that BRS and Bluetooth devices exhibit the same radiofrequency characteristics or that operators of Bluetooth services hold the same spectrum rights as BRS licensees. Instead, AHAM notes that the less destructive measure of requiring consumer notification -- which appears effective in the Bluetooth context -- should be considered before the Commission requires redesign of all microwave ovens.

^{7/} *In the Matter of Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, Second Report and Order and Second Memorandum Opinion and Order, FCC 04-285 (rel. December 16, 2004) (The “UWB Order”). The FCC’s decision in this proceeding is instructive. In the UWB Order the FCC rejected assertions that it considered largely unfounded that UWB operations will cause harmful interference to licensed operations. In the case of UWB technology, the Commission permitted the introduction of these additional devices operated under Part 15 of its rules, despite the alleged threat of harmful interference. In this case, ISM devices are already permitted in the 2496-2500 MHz band. If the FCC determined to allow the introduction of an allegedly interfering technology over the objections of already licensed users, it must certainly reject the unsupported claims of not yet licensed parties that existing operations will cause harmful interference.

^{8/} Contrary to the BRS Parties’ assertion, AHAM does not contend that it is impossible to measure emissions in-band. Instead, AHAM noted that for FCC and other purposes, emissions are measured not inside the band, but at the band edges. Microwave manufacturers do measure in-band emissions for purposes of complying with Food and Drug Administration (“FDA”) standards. However, as the BRS Parties overlook, the in-band emission limits with which microwave oven manufacturers are required to comply under FDA rules are less restrictive than those proposed by the BRS Parties by a factor of 4 million. Accordingly, in-band emission limits are measurable; the levels proposed by the BRS Parties, however, are not achievable.

Attached as Appendix A is a study conducted by the Panasonic Home Appliance Company (“Panasonic”), which outlines some of the changes in product design that might be required in order for microwave oven manufacturers to meet the in-band emission limits proposed by the BRS Parties. Briefly, the following material changes would likely be required:

- The holes in the glass doors of microwave ovens would require elimination, so that consumers would no longer be able to view food being cooked. This would be a serious safety and utility concern.
- The seals around the oven doors would require complete redesign in order to further reduce already low levels of microwave leakage.
- The air intake and exhaust holes in the interior of microwave ovens would require elimination. However, disabling air intake and exhaust would, among other things, cause water vapor accumulation and ultimately rust, poor performance, and unsanitary conditions.
- Redesign of the welding system used to assemble oven cavities.
- Reduction of the output power used by the microwave ovens.

As the Panasonic study concludes, “implementation of these countermeasures as a whole would result in greatly reduced utility of the microwave oven product to the consumer, and would substantially increase the weight and cost to produce...[and] would shake the basics of microwave oven design.”

Therefore, if the FCC accepted the request of the BRS Parties, consumers would lose by being required to accept products that are less functional and more expensive than they are today. However, consumers would have no countervailing benefit because the BRS Parties have failed to demonstrate that operation of microwave ovens would have any perceptible impact on their not yet introduced service. Even if there is any demonstrable effect on BRS operations, the BRS Parties have not demonstrated that they cannot take measures to protect their operations, as opposed to the dramatically more severe measures necessary to completely redesign microwave ovens that would be required to comply with the BRS Parties’ suggested rule changes.

AHAM supports the FCC’s efforts to promote the introduction of new technologies and services. However, those new products and services should not be introduced by eviscerating existing and highly valued consumer products. If and when there is a cognizable threat to these new services from established consumer products the FCC should act in a manner that has the least possible impact on those products.

Ms. Marlene H. Dortch

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Should you have questions regarding the foregoing, please feel free to contact me.

Sincerely,

A handwritten signature in dark ink, reading "David B. Calabrese". The signature is fluid and cursive, with the first name "David" and last name "Calabrese" clearly legible.

David B. Calabrese

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APPENDIX A

Opinion on the Proposal for a 500uV/m Limit for Radiated Emissions in the 2400MHz-2500MHz Band

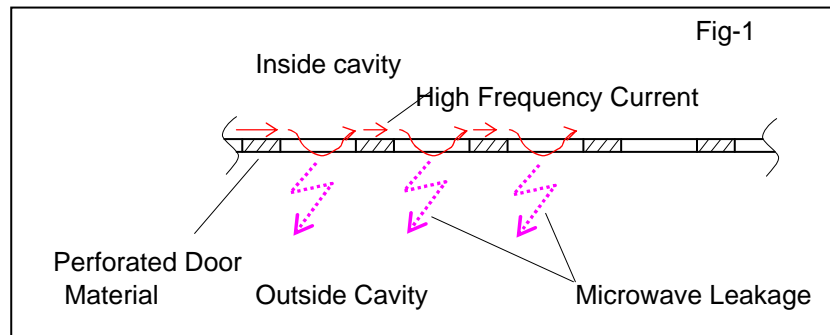
Microwave Technical Lab, Panasonic Home Appliance Company January 6, 2005

The following is Panasonic's opinions relating to the proposal for a 500uV/m Limit for Radiated Emissions in the frequency range of 2400MHz-2500MHz, as it relates to microwave ovens. Some countermeasures to meet the proposed requirements are stated here as concepts that would require extensive future technical verification. Should the proposed value of 500uV/m be applied, it is still uncertain that implementation of these measures would allow microwave ovens to conform.

1. Elimination of the oven door viewing area

There are holes of approximately 1.9 mm in diameter which are incorporated into the oven door to create a viewing area so that cooking inside the oven can be seen.

Theoretically, there is no microwave leakage through a hole having a diameter smaller than the wave length of the microwave frequency. However, minor leakage in the order of 0.2 to 0.5mW/cm can occur due to high frequency magnetic leakage at these holes, caused by interruption of high frequency current flowing on the surface of the oven door metal plate of a typical microwave oven.



2. Microwave leakage sealing around the oven door

The following design methods are utilized in the current construction of the oven door for the purpose of sealing without metal-to-metal contact.

Fig-2: An existing door choke

Fig-3: A door attached to an oven body, cross-sectional view

Fig-4: Enlarged detail of a door choke

The principle behind this design is to block microwave leakage by using a capacitive seal created by a door-oven proximity contact and by a choke seal.

The dimension X is set to a quarter wave length, and creates a wave-short condition.

This type of choke structure can be designed to minimize microwave leakage in the order of 0.02 to 0.2mw/cm.

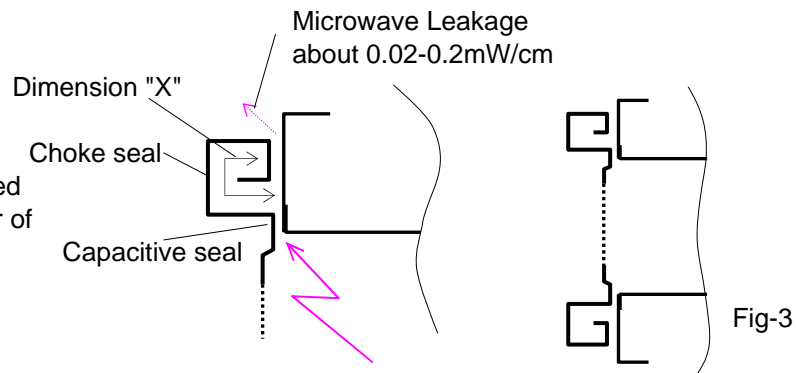
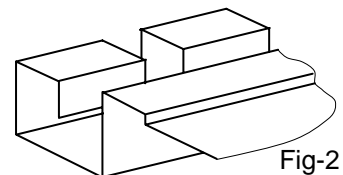


Fig-4

Microwave Power
1000 W

If regulations would require better seal performance than the above mentioned measures, additional methods are needed.

A. Seal spring Picture-1 & Fig-5

This method was applied at the dawn of microwave oven development, and created electrical contact around the oven door using a metal spring. This 50 year old technology, however, can not conform to current regulations in itself, and can be applied only as an auxiliary seal.

Since its performance can be weakened during its life and by dirt between the spring and the base, current regulations would not allow sole use of this design. This method also can not eliminate microwave leakage at the door corners, due to the butt joint structure which creates a gap.

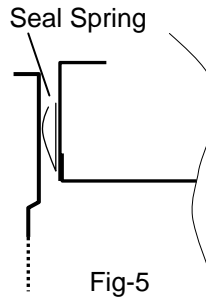
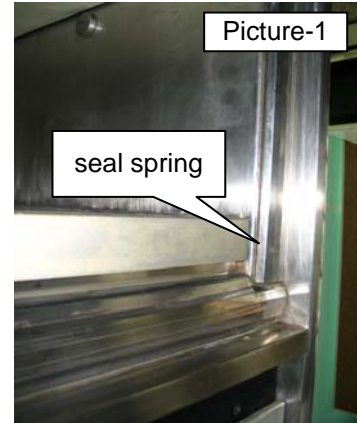


Fig-5



B. Ferrite wave absorber around the oven door

A ferrite wave absorber around the door choke will absorb microwave energy leaking through the choke.

The performance of this absorber will be far less than what is required to meet 500uV/m, and can only reduce the level of leakage by about half to 0.02 to 0.2mw/cm at its best.

Since none of above methods has adequate performance on its own, a combination of multiple methods is necessary, which will cause the size of door seal area to be larger and reduce the effective volume of the oven cavity.

3. Elimination of air intake and exhaust holes

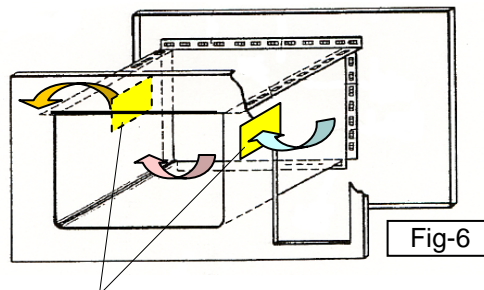
Fig-6

A microwave oven cavity has holes on the cavity wall right side and left side for exhausting cooking steam and for oven illumination. The level of microwave leakage from these holes is similar to that through the door as mentioned above, which is 0.1 to 0.2mw/cm.

Elimination of these holes is needed to eliminate microwave leakage through the cavity walls.

Elimination of these holes, will disable the illumination and the sensor cooking that is controlled by a steam sensor placed in the exhaust air duct. This will severely limit the performance of microwave cooking.

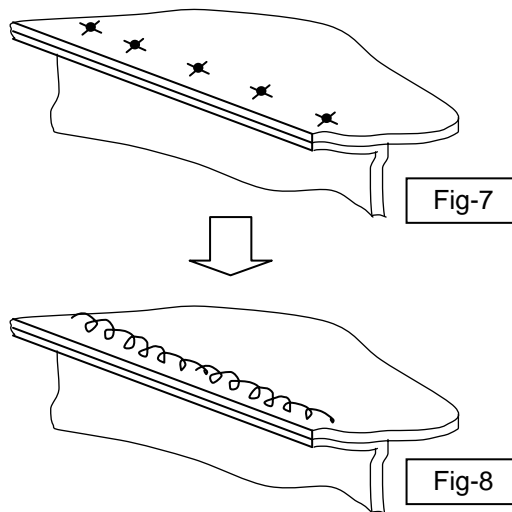
Disabling air intake and exhaust will also cause water vapor to accumulate inside of the oven cavity, thus causing rust and unsanitary conditions.



✓
Intake and Exhaust holes

4. Oven cavity welding system

Generally speaking, spot welding is used to assemble oven cavities with one inch pitch between welds as shown in Fig.-7. To lower the microwave leakage, as shown in Fig.-8, seam welding would be necessary. Changing to the seam welding system will lower the productivity and require an enormous amount of investment and related cost.



5. Output Power Reduction

A reduction of the oven output power from current levels may result in reducing emissions, but would cause increased cooking times and reduced product utility.

General countermeasures as discussed above are considered likely to be inadequate from our experience, thus some other new technological solution will be needed.

Furthermore, implementation of these countermeasures as a whole would result in greatly reduced utility of the microwave oven product to the consumer, and would substantially increase the weight and costs to produce.

These cost increases can not be absorbed by the manufacturer, and must be passed on to the consumer.

The electric field strength of a typical microwave oven at 2455MHz is between 5000uV/m to 25000uV/m, thus it appears to be a very difficult task to reduce this electric field strength to 500uV/m or less.

Consequently, this requirement would shake the basics of microwave oven design, and neither its feasibility or estimated costs to comply can be determined at this point.